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Epidemiological Imaginaries of the Social: Epidemiologists and Pathologies of Modernization in Postcolonial Africa

Abstract: There is a growing anthropological literature analyzing the place that epidemiological surveillance occupies in contemporary global health. In this article, I build on this literature and take it into new directions by exploring what I call the epidemiological imaginaries of the social. Drawing on science and technology studies, I suggest that epidemiologists help make up the world, articulating complex and normatively loaded visions of social life that both enable and constrain action. More specifically, I argue that epidemiologists tell stories about the type of societies and people that compose the world and that these stories often shape global health policies and programs in powerful ways. To substantiate this argument, I examine epidemiologists' efforts to map smoking in postcolonial Africa, documenting how they have imagined smokers and smoking through the lense of modernization theory and showing how these imaginaries have shaped tobacco control policies in the region up to this day. [epidemiological surveillance, global health metrics, social imaginary, smoking, postcolonial Africa]

Introduction

Epidemiologists and epidemiological surveillance have become central to contemporary global health policies and programs, determining which issues are worth investing in and evaluating which interventions work (Adams 2016; Biruk 2018; Reubi 2018b). A good illustration is the Global Burden of Disease (GBD) research program. Initiated by Chris Murray and Alan Lopez in the 1990s as part of the World Bank's wider efforts to rationalize health policymaking, this program has now morphed into the Institute of Health Metrics & Evaluation (IHME)—a Seattle-based epidemiological juggernaut financed by the Gates Foundation and employing over 300 epidemiologists, computer scientists, and mathematicians. Its purpose is to generate regular global estimates of health loss that, together with

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cost-effectiveness calculations for health interventions, are there to help policy-makers, funders, and activists rationally identify priorities and efficiently allocate resources (Mahajan 2019). There are many other, similar examples. They range from large international surveillance initiatives that aim to inform global health investments, such as USAID's Demographic and Health Surveys and the Oxford Malaria Atlas Project, to routine inhouse data collection and analysis carried out by health NGOs to monitor their own operations.

A growing number of anthropologists and other scholars have begun exploring the role of epidemiological surveillance in global health. Some have chronicled how epidemiological expertise has altered global health practices, pointing to the epidemiological reordering of health priorities, the combination of corporate audit and epidemiological surveillance to monitor global health initiatives, and the new focus on epidemiological evidence in health advocacy (e.g., Lorway and Khan 2014; Reubi 2018b; Storeng and Behague 2014; Wahlberg and Rose 2015). Others have documented the socio-technical infrastructures—from sophisticated computer models and generous philanthropic funding to securitized field stations and local data collectors—that make today's global health surveillance efforts possible (e.g., Adams 2016; Aellah and Geissler 2016; Biruk 2018; Mahajan 2019). In the present article, I build on this work and take it in new directions by examining the relationship between epidemiology and the social. My concern is not the socio-technical infrastructures that make epidemiological surveillance possible nor the social lives of the people surveyed by epidemiologists. What I am interested in are the socials imagined and performed by epidemiologists—what I call the epidemiological imaginaries of the social. Indeed, informed by science and technology studies, I suggest that epidemiologists play a key role in making up the world, articulating complex and normatively loaded visions of social life that both enable and constrain action and that weave together moral principles, scientific theories, and surveillance practices. Specifically, I argue that epidemiologists tell stories about the kind of societies and people that compose the world and that these stories can shape global health policies and programs in important ways.

To substantiate this argument, I analyze the efforts of epidemiologists to map the African smoking epidemic. These efforts, which started in the early 1970s and have continued to this day, provide an excellent case study. To begin with, smoking has played a central role in the postwar shift in Western medical thought associated with the emergence of social medicine and risk factor epidemiology while, more recently, it has served as a model for how to address the global non-communicable disease epidemic. Furthermore, sub-Saharan Africa has been one of the major sites of global health investments and innovations and, as such, holds a central place in global health imaginaries. I start by outlining how, over the last 50 years, a loose, transnational alliance of epidemiologists have, using a combination of social surveys and statistical modeling, sought to measure and draw attention to the tobacco epidemic in Africa. I then show how these experts did not just bring to light an epidemic but also helped articulate the social category of the African smoker and a model of tobacco use in African society shaped by modernization narratives. Finally, I describe how some of these epidemiological imaginaries about smoking and modernization in Africa have led funders, policymakers, and activists to invest in tobacco control in the region despite conflicting numbers on smoking incidence.

Performing the Social

To argue that epidemiologists perform the social is to build on work in science and technology studies that explores how the human and social sciences make up our world (e.g., Hacking 2002; Law 2009; MacKenzie et al. 2007; Osborne and Rose 1999). For scholars working within this tradition, the human and social sciences are “performative” or “productive of the social” in the sense that they do “not simply describe the world as it is, but also enact it” (Law and Urry 2004: 391–92). Put differently, they believe that these sciences play a “significant role in making up our world, and the kind of persons, phenomena and entities that inhabit it” (Osborne and Rose 1999: 368). Some of these scholars have stressed how the human and social sciences generate new “kinds of persons” and “ways of being” (Hacking 2002: 23, 103). Examples abound: “the poor, the criminal, the infanticide, the mad” of Victorian moral statistics (Hacking 1982: 286); the “opinioned or perhaps even opiated” citizen of 20th-century North American public opinion research (Osborne and Rose 1999: 392); and the “men who have sex with men” of contemporary AIDS research (Boellstorff 2011: 287). Other scholars have emphasized the “theories,” “metaphors,” and “models of social life” that the human and social sciences articulate and bring into the world (Law and Urry 2004: 390, 399). Again, there are multiple examples: late colonial psychological models on deculturation and madness among Africans (Vaughan 1991: chapter 5); neo-classical economic theory on perfect competition and expected market behaviors (MacKenzie et al. 2007: chapter 2); and political metaphors of Europe as an imagined community of solidarity found in Eurobarometer surveys (Law 2009). As these scholars suggest, these categories and theories “change the space of possibilities” for personhood and sociality, opening up new and different ways to imagine people and the worlds they inhabit (Hacking 2002: 107).

This theoretical approach and the argument I make in this article represents a departure from the notion that epidemiology, through its prioritization of measurements and numbers, leads to the erasure or neglect of the social, understood as people’s experiences and narratives. This notion, which has a long history in Western thought, has been a recurring theme in many anthropological writings on global health metrics (Porter 2012; and see Adams et al. 2019; Erikson 2012; Lorway 2017). For example, Joao Biehl and Adriana Petryna (2013: 17–18), in their influential work on global health, argue that the “lives and stories” of “people on the ground”—what they call the “unpredictable social”—are “often smoothed over and averaged out by coarse-grained statistics.” Similarly, in her research on maternal mortality statistics in Malawi, Claire Wendland (2016: 64, 74) observes how these metrics “leave out” the tragic stories of women who die in childbirth. This observation is echoed by Susan Erikson (2012: 370), who suggests in her own work on maternal health statistics in Sierra Leone that: “The free-flowing personalized narratives about this or that woman and her infant were gone. In place were monthly and yearly numerical amalgamations of births and a few deaths.”

Such observations are based on a different approach to epidemiological knowledge than the one I use in this article. While I stress the performative character of epidemiology and its power to enact the social, these authors are concerned with what they view as the “reductionist” and “decontextualised” nature of

epidemiological metrics (Adams 2016: 46; Lorway 2017: 191). Specifically, they posit that, as with other forms of numerical knowledge, the making of epidemiological metrics entails stripping “meaning and context” from “complex social phenomena” to transform them into “numerical representations” that could be compared and circulated (Davis et al. 2012: 6–8). Wendland (2016: 61, 63), for example, argues that maternal mortality indicators “flatten messy events” and “convert people into abstractions”, making “unlike situations comparable” and allowing them to “diffuse readily and be incorporated quickly into disparate contexts.” Similarly, in her work on metrics, Adams (2016: 7, 28) points out that the GBD metrics “render complex social phenomena comparable and countable,” “erasing meddlesome debates about cultural, regional and national specificities.” While different, this concern with epidemiology’s reductionist nature is not incompatible with my focus on epidemiology’s performative character. Indeed, as science and technology studies scholars have suggested, epidemiologists will inevitably, when “making particular forms of the social,” “erode,” and “silence” other “social realities” (Blouin 2020: 321; Law and Urry 2004: 395–97).

Mapping the African Smoking Epidemic

Epidemiological efforts to map smoking in sub-Saharan Africa have spanned a 50-year period, starting in the 1970s as part of international research projects on the aetiology of cancer, before continuing as a strategy to inform tobacco control initiatives in the region.

The roots of these efforts can be traced back to the development of social medicine and risk factor epidemiology in mid-20th-century Europe and North America. Associated with the postwar ideals of social solidarity and welfarism, the development of these two interrelated fields substantially transformed Western medical thought (Armstrong 1995; Porter 2002). While the object of the old hospital medicine was the pathological lesion in the diseased body, the new social medicine and risk factor epidemiology were mainly concerned with the social and environmental causes of diseases in the community. This had two consequences for medical thinking. First, it led to “the dissolution of the clinical categories of healthy and ill” and a “problematization of the normal,” with doctors leaving the hospital to go into the wider community to monitor the distribution of risk factors among the ill and the seemingly healthy (Armstrong 1995: 395). Second, with the search for risk factors stretching from physiological to behavioral patterns, the shift in focus pushed medical thought beyond the body and into an increasingly “extracorporeal” and “social space” (Armstrong 1995: 401).

This shift in the object of medicine was connected with the articulation of new modes of knowing. While the pathological lesion was investigated through clinical examinations, laboratory tests, and post-mortems, social and environmental risk factors were examined through the social survey. Ranging from standard community health questionnaires to more experimental observational studies, the survey was, to quote sociologist David Armstrong (1983: 42, 47, 52), an “apparatus of surveillance” that enabled doctors to see the “social body” and “made a truly social medicine a realizable goal.” It did so by bringing together sophisticated statistical techniques, like multivariate analysis and control groups, with knowledge from the

social sciences, from knowhow in designing questionnaires to concepts like lifestyle (Reubi 2018a). Importantly for us, the rise of social medicine and risk factor epidemiology and the elevation of the survey into a major tool of modern medicine was, to a large extent, the product of ground-breaking research on chronic disease, especially cardiovascular disease and cancer. The work of epidemiologists Austin Bradford Hill and Richard Doll on smoking and lung cancer carried out at the London School of Hygiene and Tropical Medicine in the 1940s and 1950s was particularly critical in that regard (Porter 2002).

Many of these new ideas and techniques, not least the concern with chronic diseases and their social causes and the surveillance machinery of the survey, began to make inroads on the African continent in the late colonial and early postcolonial period. The last decades of empire in both British and French Africa were characterized by a greater emphasis on development and science in the administration of colonial territories. This led to an increase in medical research in Africa, with the establishment of universities, field stations, and funding opportunities (Reynolds and Tansey 2001). While the main focus of this research was infectious disease, there was a growing interest in chronic disease from the mid-1950s onward (Moore 2016). Most of this early work on chronic disease in Africa was conducted by researchers trained in social medicine and risk factor epidemiology, who used social surveys to explore the social and environmental causes of these diseases among Africans. Like in Europe and North America, cancer was a major focus of this research on chronic disease in Africa (Mueller 2019). Championed by Doll and financed by organizations like the International Union against Cancer (UICC) and the British Empire Cancer Campaign, this work purported to “contribute to the knowledge of the causes of cancer” by comparing populations living in “different geographical circumstances and exposed to widely varying nutritional, social, economic and other environmental factors” (Doll 1973: v; Hutt and Burkitt 1965: 719).

Early efforts to map smoking in Africa in the 1970s and early 1980s directly grew out of this work on cancer. Indeed, the epidemiologists and physicians in cities like Dakar, Durban, Nairobi, London, or Paris who led these early efforts believed that studying the impact of rising smoking rates on the hitherto low incidence of lung cancer in Africa would help advance our knowledge of the aetiology of cancer (e.g., Baylet et al. 1974a; Schmidt et al. 1978). From the early 1980s to the late 1990s, efforts to map smoking increasingly become understood as a way to inform tobacco control efforts in Africa. This was the time when international tobacco control experts had come to realize that, with the tobacco industry actively seeking to establish new markets outside the West, the smoking epidemic was now spreading to Africa and other parts of what was then called the Third World. This led to the launch of international programs—the UICC’s Smoking and Lung Cancer Program; the WHO’s Tobacco or Health Program—that sought to alert African leaders to the dangers of smoking and for which knowledge about smoking prevalence was critical (Reubi and Berridge 2016). The shift from international to global health in the 1990s saw an intensification of these efforts to map smoking in Africa, with the launch of several internationally coordinated tobacco surveys. This was spurred by the multiplication of tobacco control activities in the region at the time, much of it funded by the Gates and Bloomberg foundations.

Efforts to map smoking in Africa have been articulated around two major quantification techniques. The first is the social survey. Up to the late 1990s, most of these surveys were small-scale and isolated efforts carried out by African-based physicians with occasional help from international tobacco control experts and organizations. A good illustration is the survey on smoking carried out by Professor Deji Femi-Pearse and his team at the University of Lagos with the technical support of Dr. Charles Fletcher at the Royal College of Physicians in London (Femi-Pearse et al. 1973). Another example is the survey conducted by Dr. Lore at Nairobi University, for which he received financial support from the UICC and used one of WHO's standard smoking questionnaires (Lore 1987; Lore and Lwenya 1988). In addition to these small-scale, isolated surveys, larger, multi-country surveys began to be conducted from the 1990s onward. An early example was the smoking survey run by the International Union against Tuberculosis and Lung Disease (UITLD) in 42 countries, including five in sub-Saharan Africa (Tessier et al. 1992). Other, later examples are the Global Youth and Adult Tobacco Surveys (GATS), which the U.S. Centers for Disease Control and Prevention (CDC) has conducted in over 40 African countries, and the STEPwise surveys, which the WHO has run in over 30 countries in the region (e.g., CDC 2006, 2014; WHO AFRO 2015).

The aim of these different surveys has been to measure tobacco use and attitudes about tobacco among Africans using questionnaires. For example, in their study of smoking habits in Abidjan in the early 1980s, Dr. Schmidt and his team used a questionnaire to record participants' socioeconomic status, tobacco consumption, and knowledge about the dangers of tobacco (Schmidt et al. 1981: 92–94). Similarly, the CDC's GATS use questionnaires to examine people's socioeconomic status, the number and price of cigarettes they smoke, and their attitudes about tobacco (e.g., CDC 2006, 2014). For the most part, surveys about smoking in Africa have focused on social groups that are easily accessible and inexpensive to study—medical students; teachers and school children; hospital patients—but not representative of the whole population (e.g., Lore 1987; Tessier et al. 1992). The exception are large, international surveys like the CDC's GATS and the WHO's STEPwise surveys, which are run together with national statistics agencies and collect data from a representative sample of households across the country (e.g., CDC 2014; WHO AFRO 2015).

The second major quantification method used to map smoking in Africa is estimation techniques that combine epidemiological modeling with already collected survey data. The prime example is the WHO's Tobacco or Health Program. One of the program's aims was to curate and publish reliable epidemiological information about smoking in Africa and elsewhere. Efforts in this area began in the early 1980s, but only really picked up in the 1990s, after the arrival of Alan Lopez and in conjunction with his work on global smoking-related mortality carried out with Richard Peto, a protégé of Richard Doll (e.g., WHO 1985, 1997). One key part of these efforts was to gather and assess existing data on smoking in Africa, including: countries' official smoking statistics; data on tobacco production, trade, and consumption collated by institutions like the United Nations' Food and Agriculture Organisation (FAO); and scientific studies on tobacco use in Africa. The other key part of these efforts was to build epidemiological models of the smoking epidemic to compute reliable estimates about smoking prevalence where there was no survey data or where the existing data were inconsistent. It is as part of these efforts that

Lopez and his colleagues articulated their influential model of the cigarette epidemic and produced the WHO's first Tobacco or Health Global Status Report (Lopez et al. 1994; WHO 1997). Other, more recent examples of estimation efforts include the GBD project and the work of David Mendez at Michigan (Mendez et al. 2013; Reitsma et al. 2017).

An Epidemic of Numbers

A key product of these surveys and estimation efforts was an avalanche of numbers that confirmed that the continent was in the grips of a smoking epidemic, as some had feared. French epidemiologist Paul Fréour (1989: 9), for example, who led the UITLD's pioneering multi-country smoking survey with British physician John Crofton, believed that the data clearly showed that: "Africa is faced with a smoking pandemic that is developing right in front of our eyes." A similar point was recently made by the WHO's Regional Office for Africa (2015: 15), when stating that "there is sufficient evidence to show that the tobacco epidemic is spreading" across the African continent.

The data produced in the 1970s and 1980s seemed particularly alarming. To start with, epidemiologists pointed out that the data collected by organizations like the FAO showed that cigarette consumption in Africa was rising rapidly. Crofton (1989: par. 5.1), for example, warned that tobacco use in Africa was "increasing at an alarming rate." Specifically, he noted that while "global consumption had risen by 7 per cent between 1970 and 1985," African countries like Kenya had experienced "formidable rises" of over 30% (Crofton 1990: 164). These experts also drew attention to the high smoking prevalence rates among men across the continent. In an early report for the WHO, one epidemiologist stressed that, in Africa, it was "rare to find less than 40 per cent of males regularly smoking" (WHO 1978: 1). Similarly, Crofton (1984: 269) pointed out in the *International Journal of Epidemiology* that, in most African countries, "some 50 per cent of men are dependent on some form of tobacco use." The prevalence figures used by these experts came from the small-scale smoking surveys that were being carried out in cities across the region at the time. For example, Femi-Pearse's (1973) often-cited study of smoking in Lagos showed that about 40% of adult men in the Nigerian city smoked on a regular basis. Similarly, a survey at Nairobi's Kenyatta National Hospital conducted by Lore and Lwenya (1988) showed that 50% of the male staff were regular tobacco users.

The prevalence data from the 1990s onward seemed to be lower but no less concerning. As epidemiologists pointed out, the data during this period continued to show a "growth in the number of smokers and cigarettes smoked in Africa," even if this growth seemed to have slowed down (Blecher and Ross 2013: 1). So, a recent report on the impact of tobacco use published by the African Union (2012: 4) noted that, between 1995 and 2000, tobacco consumption in Africa had risen by "3.2 per cent," markedly lower than the 30% rise reported by Crofton two decades earlier. Moreover, while epidemiologists continued to judge that smoking levels were "high in the majority of sub-Saharan African countries," they also acknowledged that these levels were "relatively low compared to other developing countries" (Brathwaite et al. 2015: 13; Townsend et al. 2006: 25). Indeed, numbers on tobacco use among African adult males from 1990 onward usually ranged from 10 to 30%, down from

40 to 60% in the 1970s and 1980s. For example, Lopez and his team estimated that, apart from richer countries like South Africa and Mauritius where rates were close to 50%, smoking prevalence among males in Africa was “possibly as low as 25 per cent” (WHO 1997: 11). Likewise, the UITLD multi-country survey counted about 20% of smokers among male medical students in Benin, Kenya, Madagascar, Nigeria, and Senegal (Tessier et al. 1992). More recent surveys and estimates have confirmed these trends (e.g., CDC 2014; WHO AFRO 2015).

The African Smoker

Efforts to map tobacco use in Africa did not just generate numbers and confirm that the smoking epidemic was spreading across the region. It also helped bring into being what Hacking (2002: 100) would call a new “kind of person”—the African smoker. This novel social category, which opened up new ways to understand people, emerged in epidemiological writings between the early 1970s and mid-1990s. An early description can be found in an article entitled “The Profile of the African Smoker” published in the *East African Medical Journal* in 1984 by Ghanaian epidemiologist Joe Pobee: “The African smoker ... is an urban male cigarette user who starts in adolescence. ... The female is not much of a smoker” (Pobee et al. 1984: 227–29).

As Pobee’s quote makes clear, gender was a defining trait of the African smoker. This was repeatedly commented on by epidemiologists working in the field. For example, Derek Yach, a South African physician who became instrumental in the making of the WHO’s Framework Convention on Tobacco Control, and his colleagues at Cape Town’s Centre for Epidemiological Research explained: “the strongest determinant of smoking [in Africa] is gender,” with “young girls and women smoking at very low level” (Strebel et al. 1989: 212). Similarly, when discussing the results of their multi-country survey, Fréour and Crofton noted that “the amount of smoking by women was very different in Europe and Africa,” with the proportion of female smokers “much lower” in the latter (Tessier et al. 1992: 98–99). For researchers, the “very low smoking rate among females” in Africa was due to “socio-cultural factors” (Onadeko and Awotedu 1983: 126). Specifically, they pointed out that most communities across the region deemed smoking to be “a very bad behavior for women,” which was “not ladylike” and “linked with lax morals” and “professionally promiscuous women” (Arya and Bennett 1970: 27; Waldron et al. 1988: 1272).

Another important characteristic of the African smoker besides gender was youth and urbanicity. As Crofton explained, the “increase in smoking prevalence” in Africa happened “especially in the young and especially in towns” (Mackay and Crofton 1996: 208). In the minds of epidemiologists, cities in Africa—typified by rapid, chaotic growth, a young, often unemployed population fueled by migration from the countryside, and new Western forms of living—represented an environment that was propitious to smoking. Bruno Monteiro (1982), for example, a physician from Cotonou, Benin, who had helped run the UITLD smoking survey, lamented that: “With the introduction of Western customs, and all the attendant false values, young people in the cities imitating film heroes or advertising posters have begun to smoke

on a large scale. ... [It is among] this rootless youth of the towns [that smoking has been on the rise].”

This was echoed by Fréour (1985: 267–70) who believed that “the new Western form of smoking” spreading across Africa was an “urban form of smoking practiced by young people” who lived in the poor, sprawling “shantytowns” found in most of the continent’s cities. For these young urban smokers, the preferred mode of tobacco use was smoking cigarettes rather than smoking pipes or chewing tobacco. As Henri Baylet and his team remarked about the students they surveyed at the University of Dakar: “young people prefer to smoke cigarettes. To be cool in nightclubs or at the movies, you cannot chew tobacco or smoke the pipe” (Baylet et al. 1974b: 83).

This idea of the African smoker as a young, urban male, which crystalized between the early 1970s and mid-1990s, has remained central to contemporary epidemiological imaginaries. As one expert explained in a recent research paper on smoking in Malawi and Zambia: “cigarettes are used most in urban areas” and “most by men” (Pampel 2005: 1012). Similarly, a systematic review of epidemiological studies on tobacco use in Africa concluded that smoking levels in the region are “consistently higher in men compared to women” and that “more adults residing in urban areas smoked compared to rural areas” (Brathwaite et al. 2015: 7, 11). The reason given for low female smoking prevalence in the region was a familiar one: “the presence of strong social norms and taboos” that view smoking as “inappropriate” for women and “discourage” them from doing so (Brathwaite et al. 2015: 10). As a team of researchers from the Ivory Coast noted: “in Africa, female smoking is frowned upon; a woman who smokes is considered to have a bad character” (Kouassi et al. 2013: 278). Moreover, health experts continue to imagine that the tobacco epidemic in Africa “impacts principally youth” (Wayzani et al. 2015: 269). For example, a recent report from the African Union (2012: 4) asserted that “most new smokers [on the continent] are youth, aged 13 to 18 years, and often as young as 8 or 9 years.”

Smoking and the Modernization of Africa

In addition to bringing into being a new kind of person, epidemiologists mapping smoking in Africa have also helped articulate new “theories” and “models of social life” (Law and Urry 2004: 390, 399). Specifically, drawing on the language and models of modernization theory, they have imagined African society moving from tradition to modernity and portrayed the rise of tobacco use in the region as the result of economic development and industrialization as well as new urban lifestyles and female emancipation.

Modernization theory came to dominate imaginaries of Africa and development during and after decolonization. This social theory was enthusiastically embraced not just by Western development specialists but also by political leaders and intellectuals across Africa. As Frederick Cooper (2004) has argued, this enthusiasm stemmed from the possibility of change that modernization theory seemed to encompass. Indeed, while colonial administrators had imagined Africans as immutably fixed in race and tradition, modernization theorists believed that Africans could, through the process of development, free themselves from tradition and become, in the words of economist Gunnar Myrdal, “new,” “modern men” (cited in Arndt

1987: 53). Tradition and modernity, here, referred to social forms that stood at the opposite ends of progress (Cooper 2004). Specifically, tradition was associated with the simple societies deemed typical of Africa and distinguished by patriarchal, tribal structures, subsistence, agrarian economies with archaic production methods, poor, rural living conditions, superstition, and religion as well as high fertility and low life expectancy. In contrast, modernity was associated with the imagined, advanced societies of North America and Europe characterized by nation-states, female emancipation, market-based, industrialized economies, city life, reason and entrepreneurship as well as low fertility and high life expectancy. In this dichotomous world of modernization theory, the task of political leaders was to lead the continent's newly independent nations from poverty and tradition to prosperity and modernity by investing in large industrialization projects (Arndt 1987).

Epidemiologists who sought to map smoking in Africa between the early 1970s and mid-1990s borrowed extensively from these ideas, language, and models. Like development experts and political leaders before them, they imagined that Africa was modernizing rapidly and believed that this was leading to an increase in smoking prevalence and smoking-related diseases like lung cancer across the region. Schmidt and his team in Abidjan, for example, viewed lung cancer, whose incidence among Africans was rising due to increased tobacco use, as a "pathology associated with development" (Schmidt et al. 1978: 1830). In the same way, another West Africa-based epidemiologist argued that the advent of smoking-attributable lung cancer in the region was a typical "pathology of development," whereby "the evolution of a population's mode of life" has led to the emergence of "new risk factors" and "a new pathology" (Loubière 1981: 34–35). American public health specialist Kenneth Warner (1984: 32) expressed a similar sentiment when suggesting that the "rapid adoption of smoking" in Africa was because the region was "modernizing all too quickly."

More specifically, these epidemiologists associated the rise of tobacco use in Africa with three aspects of modernization. First, many of them saw a strong correlation between smoking and industrialization or economic growth. Femi-Pearse and his collaborators, for example, noted that because of the "improved cash economy consequent upon industrialization," smoking is on the increase in many African towns (Femi-Pearse et al. 1973: 57). A case in point, they argued, was "metropolitan Lagos", where "the nation's foremost seaport" and over "70 per cent of the nation's industries were located" (Femi-Pearse et al. 1973: 57). Hassam Gareebo (1990: 249) in Mauritius made a similar point, arguing that increases in smoking prevalence in the island-state were "due to the rapidly improved economic situation," with the "economy having shifted from purely agricultural to mainly industrial." This was echoed by David Nostbakken (1990: 170), the head of the UICC tobacco control efforts in Africa in the 1980s, who stated that "economic prosperity and growth [are] important predictors of cigarette consumption" in the region, with "evidence suggesting that per capita consumption increases as per capita income increases."

Second, epidemiologists working on tobacco in Africa also often associated smoking with urbanization and the uptake of Western lifestyles. Yach (1996: 31–32), for example, thought that "urbanization [and] westernization" had "led to an increase in smoking in many African countries." Specifically, epidemiologists believed that, in rural areas characterized by "traditional patterns of life," tobacco

consumption was low and forms of use were “traditional,” like pipe smoking and tobacco chewing (Baylet et al. 1974c: 40; Burkitt 1973: 275; Wone et al. 1980: 245). By contrast, they thought that, in cities where there had been a loss of tradition and the adoption of a “more evolved,” “Western manner of life,” smoking prevalence was higher and took the form of the “modern,” “industrial cigarette” (Baylet et al. 1974a: 42; Wone et al. 1980: 245; Fréour 1985: 9). For example, Baylet and his team concluded from their studies in Senegal that:

Urbanization has led to changes both in the forms of smoking, with people abandoning traditional forms and preferring cigarettes, and in smoking incidence, which is higher in the urban milieu. The urban subject who can afford cigarettes is often in a stronger economic position and has taken up a more evolved way of life. With urbanization, the Western mode of smoking has replaced the traditional form of smoking like the pipe and chewing (Baylet et al. 1974a: 42; Baylet et al. 1974b: 83; Baylet et al. 1974c: 40).

Third, epidemiologists also associated smoking among African women with a shift from tradition to modernity. They held that low smoking among African women was due to traditional sex roles, which imposed a range of restrictions on female behavior, including the prohibition to use tobacco. As Waldron (1991: 989) argued: “traditional sex roles, including men’s greater social power and generally greater restrictions on women’s behavior, has contributed to widespread social pressures against women smoking.” The few women who did smoke on the continent were deemed to be modern, educated, and urban. For example, Simon Chapman (1992: 281), who worked as a consultant for the UICC, remarked that smoking among African women, is generally “confined to the small proportion who are culturally or economically elite.” Similarly, Baylet and his collaborators (1974b: 83) noted that the few women who smoked in Senegal were “very urbanized, young women” and “intellectuals” who “contested what they saw as a limit to their liberty.” Given these beliefs, it is no wonder that epidemiologists predicted that female smoking in Africa would pick up as the continent modernized and women liberated themselves. As Kaplan and her colleagues (1990: 310) argued about Kenya, “modernization” would “lead to increasing sexual equity” and “increased cigarette smoking among women.”

The most influential attempt at narrating smoking in Africa within a modernization framework was Lopez’s 1994 model of the tobacco epidemic (Reubi 2016). Like Walt Rostow’s *Stages of Economic Growth* model, the Lopez model identifies four successive, 25-year phases through which the epidemic unfolds. Throughout all stages, the epidemic is characterized through three explicit variables—smoking prevalence, smoking-attributable deaths, and the state of tobacco control policies. The first stage is the start of the epidemic, when smoking becomes widely acceptable, with male prevalence rising, female prevalence remaining low, and tobacco control measures nonexistent. The second stage sees male prevalence peaking, female prevalence jumping up, and male smoking-attributable mortality starting to rise. The third stage is a turning point, with male prevalence beginning to decline, female smoking plateauing, and tobacco control measures put in place. The fourth stage is the tail end of the epidemic as tobacco control measures harden and

smoking prevalence continues to decline. Crucially for us, the Lopez model has a fourth, implicit variable: a country's level of economic development, which rises in tandem with smoking prevalence. So, Lopez and his colleagues (1994, 245–46) thought that “developing countries ... in sub-Saharan Africa are currently in Stage I,” while the more developed countries of “Asia [and] Latin America” are in Stage II, and most of the rich, industrialized “countries of Western Europe along with Australia, Canada and the US are ... [in] Stage IV.”

Like the category of the African smoker, this talk of Africa modernizing and smoking as a product of economic growth, urbanization, and female emancipation has remained central to contemporary epidemiological thought. Indeed, epidemiologists today continue to draw on Lopez's model, thinking that Africa is in the early stages of the tobacco epidemic and that smoking will soon rise if nothing is done. For example, epidemiologists working on the CDC's GATS recently argued that “sub-Saharan African countries” are “in the early stages of a tobacco epidemic” and would soon “face an increase in smoking prevalence if there are no significant interventions to slow and prevent the epidemic” (Mbulo et al. 2016: S10, S12). The reasons why these and other present-day epidemiologists believe that smoking will soon rise in the region are the usual ones. First, they believe that economic growth and rising incomes will allow an increasing number of Africans to purchase cigarettes. As two experts from the University of Cape Town explained in a report for the Gates Foundation: “As the economy grows and incomes rise,” there will be “growth in the number of smokers and cigarettes smoked in Africa” (Blecher and Ross 2013: 1–2). Second, many epidemiologists assume that smoking will rise with the continent's rapid urbanization and Westernization. For example, experts working for the Canadian International Development and Research Council (2016: 1) argued that, as countries in the region urbanize and modernize, “greater numbers of Africans are adopting [unhealthy Western] lifestyles” like cigarette smoking. Third and finally, epidemiologists continue to associate growing female tobacco use in Africa with “the modernization of society” and “women taking up smoking to emancipate themselves” (Kouassi et al. 2013: 281).

Although not the main focus of my article, it is worth noting that, when producing these social imaginaries of smoking and modernization in Africa, epidemiologists inevitably ignored and eroded other social realities. This erosion takes place across different levels and moments. First, epidemiologists' choice of the social survey as their preferred research method impacts the sort of stories they can and cannot tell about smokers and smoking. Indeed, the structured questionnaires they tend to use do not generally allow them to say much about the web of meanings that people attach to smoking, in contrast to researchers committed to ethnography and thick description (Adams et al. 2019; Porter 2012). Second, to craft an ideal type like the African smoker, epidemiologists need to accentuate traits that hold across the continent while erasing unique individual qualities and regional variations (Adams 2016). Third, the modernization framework used by epidemiologists to model smoking in Africa does not really encourage them to examine the political economy of the tobacco epidemic and, especially, the role of the cigarette industry in the making of the epidemic. To know about how this industry has exploited small farmers, encouraged deforestation, and promoted smoking through aggressive marketing strategies,

one would need to read the work of neo-Marxist economists, environmentalists and development experts (e.g., Currie and Ray 1984; Muller 1978).

The Power of Epidemiological Imaginaries

The imaginaries about smokers and smoking in Africa articulated by epidemiologists have been influential, shaping tobacco control efforts on the continent over the last 20 years. The narrative about Africa being at the start of a smoking epidemic that will soon surge as the continent grows and modernizes has been especially influential. Indeed, many policymakers, funders, experts, and activists working in global health in the region use it to justify paying attention and allocating resources to tobacco control, even though smoking incidence and smoking-related diseases remain low in Africa (WHO AFRO 2015). The way the Gates Foundation (2015) justifies investing millions of dollars into tobacco control in the region is a good example:

We see great opportunities in ... Africa. The tobacco epidemic in Africa is at a relatively early stage, so now is a critical time to invest in campaigns ... that can prevent a large-scale epidemic. As incomes rise for a growing African population, tobacco use could double in the coming years if strong tobacco control measures are not implemented.

The African Union has used similar arguments to encourage member states to prioritize tobacco control, explaining that “Africa is still in the early stages of the tobacco epidemic” and that African governments “must intervene now to prevent [future] tobacco-related death [and] disease” (Zuma 2013: 831). African health activists, too, use these sorts of arguments when pleading for more tobacco control efforts in the region. As one East African activist explained to me in an interview:

Africa is in Stage I [in the Lopez model] with really low smoking prevalence and most smokers being men. ... With economic development, also female empowerment and western lifestyles ... this figure is going to change and if nothing is done now the epidemic will spread [and] we will have more non-communicable diseases.

What is remarkable is that these narratives about smoking and modernization in Africa have led funders, policymakers, and activists to invest in tobacco control in spite of the numbers on smoking incidence in the region. Indeed, the story of smoking in Africa told through the lens of modernization theory, and best exemplified by the Lopez model, does not fit well with the data on tobacco use collected on the continent. So, if we follow the Lopez model, Africa was already in the first stage of the epidemic in the early 1990s, with male smoking prevalence at 15%, and would now be, about 30 years later, in the second stage, with male smoking prevalence at 60% (Lopez et al. 1994). However, if anything, the epidemiological data available for Africa show a decrease in smoking prevalence over this period. So, for example, the WHO’s estimates for the late 1970s indicated 40% for male smoking prevalence while its estimates for the late 1990s and late 2010s showed 25 and 17% respectively (WHO 1978, 1997, 2019). Data from surveys seem to suggest a similar

trend. As mentioned earlier, surveys in the 1970s and 1980s measured male smoking prevalence between 40 and 50%, while surveys in the 1990s counted around 20–30% of men who smoked (e.g., Femi-Pearse et al. 1973; Lore and Lwenya 1988; Tessier et al. 1992). And more recent surveys, like the CDC's GATS, have measured male smoking prevalence rates from about 10% in Ghana to about 19% in Kenya (CDC 2014; Pampel 2008). This downward trend is further confirmed by IHME researchers, who have argued that male smoking prevalence decreased in most African countries between 1990 and 2015 (Reitsma et al. 2017).

Conclusion

In this article, I have looked at epidemiological efforts to survey smoking in Africa to draw our attention to the ways epidemiologists imagine the social and how these imaginaries influence global health programs and policies. In these concluding remarks, I want to revisit some of the key insights that such an approach can offer to the study of global epidemiological surveillance practices.

A major concern throughout the article has been to stress the performative character of epidemiology and its power to produce the social. This builds on work in science and technology studies that suggests that the human and social sciences are performative of the social—they bring into being new social categories and models that change the ways we imagine people and the worlds they inhabit. Applying these insights to epidemiological efforts to map the African tobacco epidemic, I showed that these efforts generated not just numbers but also the figure of the African smoker and theories about smoking and modernity in African societies. Put differently, epidemiologists did not just count the number of smokers in the region but also told stories about who they were—young, mostly men with a few women, living in fast growing, often frantic African cities—and why they smoked—because of the modernization of African societies, which entailed rising incomes, mimicking Western lifestyles, and shifting gender roles. It is worth emphasizing that, while my concern with performativity is different from the focus on epidemiology's reductionist tendencies found in some of the anthropological literature on global health metrics, the two are not incompatible. Indeed, as I noted, when articulating their imaginaries about smoking and modernization in Africa, epidemiologists also silenced and eroded other social realities because of their theoretical approaches and methodological choices.

Another one of my concerns in the article has been to document the life of these imaginaries of smoking in Africa, looking both backward at their genealogies and forward at how they have gone on to shape health policies and investments. A standard genealogy of present-day global epidemiological surveillance practices would record how they grew out of vital statistics and national censuses in 19th-century Europe. Here I took a path less traveled, tracing the origins of efforts to survey the African smoking epidemic back to the rise of social medicine and risk factor epidemiology in North America and Europe in the mid-20th century as well as to medical research on the causes of cancer in British and French Africa in the late colonial period. Looking forward, I detailed how these imaginaries of smoking in Africa, once articulated by epidemiologists, took on a life of their own and went on to convince funders, policymakers, and activists to invest in tobacco control in

the region. And, what is remarkable here and a striking manifestation of the power of social imaginaries in global health, is that they convinced them *despite* the fact that the existing numbers on smoking prevalence in Africa are low and have been declining for the last 50 years.

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